

SITE: Chevron-Artho
 BREAK: 4.2 V3
 OTHER: _____

TABLE 2-1
 CHEMICALS DETECTED IN SHALLOW GROUNDWATER
 CHEVRON ORLANDO SITE

Chemical	Frequency of Detection	Range of Detects (ug/l)	Average Detected Concentration (1) (ug/l)	Region III Screening Values (2) (ug/l)	REASON FOR ELIMINATION (If applicable)
<u>VOLATILE ORGANICS</u>					
CHLOROETHANE	1 / 25	3.0 - 3.0	3.0	860	Does not exceed screening concentration
1,1-DICHLOROETHANE	3 / 25	0.8 - 9.7	5.0	81	Does not exceed screening concentration
1,2-DICHLOROBENZENE	5 / 25	2.6 - 8	4.0	37	Does not exceed screening concentration
1,2-DICHLOROPROpane	1 / 25	0.6 - 0.6	0.6	0.16	Detected at less than 5% frequency
1,4-DICHLOROBENZENE	6 / 25	5.7 - 24	11.4	0.44	
BENZENE	8 / 25	1.1 - 22	6.6	0.36	
CHLOROBENZENE	9 / 25	1.4 - 62	15.9	3.9	
CHLOROFORM	1 / 25	2.3 - 2.3	2.3	0.15	Detected at less than 5% frequency
ETHYLBENZENE	11 / 25	0.9 - 2000	250	130	
TOLUENE	7 / 25	1.2 - 12	6	75	Does not exceed screening concentration
XYLEMES	12 / 25	4 - 5900	659	1200	
<u>BASE NEUTRAL ORGANICS</u>					
1,2,4-TRICHLOROBENZENE	1 / 25	20 - 20	20	19	Detected at less than 5% frequency
2,4-DIMETHYLPHENOL	2 / 25	22 - 28	25	73	
2-METHYLNAPHTHALENE	6 / 25	26 - 110	52	NL	
2-METHYLPHENOL	1 / 25	26 - 26	26	180	Detected at less than 5% frequency
DI-N-BUTYL PHTHALATE	7 / 25	10 - 64	33	370	Does not exceed screening concentration
NAPHTHALENE	3 / 25	38 - 112	64	NL	
BIS(2-ETHYLHEXYL)PHTHALATE	1 / 25	36 - 36	36	4.8	Found in less than 5% of samples
DI-N-OCTYLPHTHALATE	1 / 25	32 - 32	32	73	Does not exceed screening concentration
<u>PESTICIDE/PCBs</u>					
4,4'-DDD	2 / 25	2.3 - 3	2.7	0.28	
ALPHA-BHC	11 / 25	0.14 - 9.2	2.9	0.011	
BETA-BHC	11 / 25	0.32 - 70	10	0.037	
CHLORDANE	1 / 25	12 - 12	12.0	0.052	Detected at less than 5% frequency
DELTA-BHC	11 / 25	0.09 - 37	6.9	NL	
GAMMA-BHC	3 / 25	1 - 3.6	1.9	0.052	
NALED	1 / 25	14 - 14	14.0	7.30	Detected at less than 5% frequency
PARATHION ETHYL	1 / 25	15 - 15	15	22	Does not exceed screening concentration
AROCHLOR-1260	2 / 25	3.1 - 45	24	0.0087	
<u>INORGANICS</u>					
ARSENIC	3 / 25	11 - 46	25	1.1000	
CHROMIUM	10 / 25	0.05 - 1.6	0.27	18	
LEAD	21 / 25	5 - 330	61	NL	Does not exceed screening concentration

NL - Not Listed

ND - Not Detected

(1) Only samples with detects were used when calculating average concentrations for each compound.

(2) These values were obtained from EPA Region III Risk based concentrations technical guidance for selecting chemicals of potential concern.

The values listed represent tapwater criteria (11/8/94).



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TABLE 2-2
PESTICIDES DETECTED IN ONSITE SOIL SAMPLES (SURFACE)
CHEVRON ORLANDO SITE

Chemical	Frequency of Detection	Range of Detects (mg/kg)	Average Detected Concentration (1) (mg/kg)	Region III Screening Values (2) (mg/kg)	REASON FOR ELIMINATION (If applicable)
<u>PESTICIDE/PCBs</u>					
4,4'-DDD	25 / 81	0.04 - 21	4.226	2.70	
4,4'-DDE	12 / 79	0.147 - 3.1	1.246	1.9	
4,4'-DDT	27 / 81	0.053 - 58	4.229	1.9	
ALDRIN	5 / 82	0.019 - 13	3.434	0.038	
ALPHA-BHC	4 / 82	1.1 - 130	34.475	0.10	Detected at less than 5% frequency
BETA-BHC	7 / 82	0.005 - 21	3.462	0.35	
CHLORDANE	54 / 82	0.088 - 79	8.96	0.49	
DELTA-BHC	3 / 81	0.012 - 3.3	1.90	NL	Detected at less than 5% frequency
DIELDRIN	12 / 79	0.029 - 11	2.486	0.04	
ENDRIN	5 / 77	0.081 - 2.2	0.70	2.30	Does not exceed screening concentration
GAMMA-BHC	1 / 82	1 - 1	1.00	0.49	Detected at less than 5% frequency
HEPTACHLOR EPOXIDE	4 / 80	0.0058 - 0.6	0.24	0.07	
METHOXYCHLOR	1 / 82	0.053 - 0.053	0.053	39	Does not exceed screening concentration

NL - Not Listed

ND - Not Detected

(1) Only samples with detects were used when calculating average concentrations for each compound.

(2) These values were obtained from EPA Region III Risk based concentrations technical guidance for selecting chemicals of potential concern.

The values listed represent residential soil concentrations (11/8/94).

TABLE 2-3
CHEMICALS DETECTED IN ONSITE SOIL SAMPLES (SURFACE AND SUBSURFACE)
CHEVRON ORLANDO SITE

Chemical	Frequency of Detection	Range of Detects (mg/kg)	Average Detected Concentration (1) (mg/kg)	Region III Screening Values (2) (mg/kg)	REASON FOR ELIMINATION (If applicable)
VOLATILE ORGANICS					
TOLUENE	4 / 72	0.12 - 3.2	1.4	1600	Does not exceed screening value
CHLOROBENZENE	9 / 72	0.17 - 5.8	1.6	160	Does not exceed screening value
ETHYLBENZENE	10 / 72	0.13 - 85	12.0	780	Does not exceed screening value
1,2-DICHLOROBENZENE	9 / 72	0.18 - 1.1	0.5	700	Does not exceed screening value
1,4-DICHLOROBENZENE	10 / 72	0.53 - 9.5	3.2	27	Does not exceed screening value
XYLEMES	23 / 72	0.13 - 420	49.0	16000	Does not exceed screening value
BASE NEUTRAL ORGANICS					
PYRENE	2 / 70	0.45 - 0.68	0.6	230	Does not exceed screening value
METHYL TERT-BUTYL ETHER	10 / 70	0.17 - 2.8	0.6	39	Does not exceed screening value
2-METHYLNAPHTHALENE	8 / 70	0.65 - 12	3.2	NL	
BIS(2-ETHYLHEXYL)PHthalate	8 / 70	0.35 - 0.69	0.5	46	Does not exceed screening value
1,2,4-TRICHLOROBENZENE	1 / 70	0.84 - 0.84	0.8	78	Does not exceed screening value
PESTICIDE/PCBs					
4,4'-DDD	126 / 271	0.011 - 210	21	2.70	
4,4'-DDE	49 / 215	0.007 - 21	3.9	1.90	
4,4'-DDT	50 / 271	0.053 - 58	6.5	1.90	
ALDRIN	19 / 225	0.019 - 23	5.8	0.038	
ALPHA-BHC	13 / 225	0.5 - 130	15.2	0.1	
BETA-BHC	15 / 225	0.005 - 21	2.6	0.35	
CHLORDANE	187 / 273	0.048 - 350	35	0.49	
DELTA-BHC	21 / 216	0.0011 - 8.3	2.2	NL	
DIELDRIN	56 / 222	0.029 - 19	3.2	0.04	
ENDRIN	14 / 216	0.014 - 6.7	1.8	2.30	
GAMMA-BHC	12 / 225	0.3 - 19	5.24	0.49	
HEPTACHLOR EPOXIDE	6 / 216	0.0058 - 3.4	1.2	0.07	Detected at less than 5% frequency
METHOXYSCHLOR	1 / 216	0.053 - 0.053	0.053	39	Does not exceed screening concentration

NL - Not Listed

(1) Only samples with detects were used when calculating average concentrations for each compound.

(2) These values were obtained from EPA Region III Risk based concentrations technical guidance for selecting chemicals of potential concern.

The values listed represent residential soil concentrations (11/8/94).

TABLE 2-4
CHEMICALS DETECTED IN TRAILER PARK SOIL SAMPLES (SURFACE)
CHEVRON ORLANDO SITE

Chemical	Frequency of Detection	Range of Detects (mg/kg)	Average Detected Concentration (1) (mg/kg)	Region III Screening Values (2) (mg/kg)	REASON FOR ELIMINATION (if applicable)
<u>VOLATILE ORGANICS</u>					
ACETONE	1 / 7	0.088 - 0.088	0.088	780	Does not exceed screening concentration
<u>BASE NEUTRAL ORGANICS</u>					
DI-N-BUTYL PHTHALATE	3 / 7	0.33 - 1.9	0.900	780	Does not exceed screening concentration
<u>PESTICIDE/PCBs</u>					
4,4'-DDD	9 / 53	0.009 - 0.1	0.029	2.70	Does not exceed screening concentration
4,4'-DDE	45 / 53	0.0091 - 0.55	0.132	1.90	Does not exceed screening concentration
4,4'-DDT	46 / 53	0.006 - 0.9	0.145	1.90	Does not exceed screening concentration
CHLORDANE	50 / 53	0.0042 - 5.3	1.147	0.49	
DIELDRIN	16 / 53	0.0079 - 1.1	0.155	0.04	
ENDOSULFAN	1 / 46	0.026 - 0.026	0.026	47	Does not exceed screening concentration
ENDRIN	1 / 53	0.16 - 0.16	0.160	2.3	Detected at less than 5% frequency
HEPTACHLOR EPOXIDE	2 / 46	0.007 - 0.011	0.004	0.070	Detected at less than 5% frequency
METHOXYPHOR	2 / 46	0.025 - 0.086	0.056	39.0	Detected at less than 5% frequency
HEPTACHLOR	2 / 56	0.008 - 0.019	0.013	0.14	Does not exceed screening concentration
a-BHC	1 / 56	0.014 - 0.014	0.014	0.1	Does not exceed screening concentration
g-BHC	1 / 56	0.015 - 0.015	0.015	0.5	Does not exceed screening concentration
<u>INORGANICS</u>					
CHROMIUM	7 / 7	3.0 - 11.0	6.0	39	Does not exceed screening concentration
LEAD	7 / 7	15.0 - 130.0	79.0	NL	

NL - Not Listed

ND - Not Detected

(1) Only samples with detects were used when calculating average concentrations for each compound.

(2) These values were obtained from EPA Region III Risk based concentrations technical guidance for selecting chemicals of potential concern.

The values listed represent residential soil concentrations (7/11/94).

Table 2-5
Chemicals of Potential Concern
Chevron Orlando Site
Risk Assessment

		Media		
Contaminant	Onsite Surface Soil	Onsite Surface and Subsurface Soil	Trailer Park Surface Soil	Shallow Groundwater
ORGANICS				
Benzene				X
Chlorobenzene				X
Ethylbenzene				X
Xylenes				X
1,4-Dichlorobenzene				X
2,4-Dimethylphenol				X
2-Methylnaphthalene*		X		X
Naphthalene				X
Chlordane	X	X	X	
Heptachlor epoxide	X			
Aldrin	X	X		
Dieldrin	X	X	X	
4,4'-DDD	X	X		X
4,4'-DDT	X	X		
4,4'-DDE	X	X		
Arochlor -1260				X
Endrin		X		
a-BHC		X		X
b-BHC	X	X		X
g-BHC		X		X
d-BHC*		X		X
INORGANICS				
Arsenic				X
Lead			X	X

*This compound was retained as a chemical of potential concern in onsite surface and subsurface soil, and shallow groundwater. However, it does not have an EPA-approved reference dose or cancer slope factor; therefore, it will not be evaluated in the quantitative risk assessment.

Table 3-1
Shallow Groundwater
 Chevron Orlando Site
 Risk Assessment

Compound or Analyte (ug/l)	95% Upper Confidence Limit	Maximum Value	Exposure Point Concentration
<u>VOLATILE ORGANICS</u>			
1,4-DICHLOROBENZENE	5.6E+00	2.4E+01	2.4E+01
BENZENE	4.2E+00	2.2E+01	4.2E+00
CHLOROBENZENE	9.9E+00	6.2E+01	9.9E+00
ETHYLBENZENE	2.4E+06	2.0E+03	2.0E+03
XYLEMES	2.9E+04	5.9E+03	5.9E+03
<u>BASE NEUTRAL ORGANICS</u>			
2,4-DIMETHYLPHENOL	7.4E+00	2.8E+01	2.8E+01
2-METHYLNAPHTHALENE	2.3E+01	1.1E+02	1.1E+02
NAPHTHALENE	1.4E+01	1.1E+02	1.1E+02
PCB-1260	2.1E+00	4.5E+01	2.1E+00
<u>PESTICIDE/PCBs</u>			
4,4'-DDD	3.2E-01	3.0E+00	3.0E+00
ALPHA-BHC	1.4E+01	9.2E+00	9.2E+00
BETA-BHC	8.2E+01	7.0E+01	7.0E+01
DELTA-BHC	1.5E+02	3.7E+01	3.7E+01
GAMMA-BHC	2.6E-01	3.6E+00	3.6E+00
<u>INORGANICS</u>			
ARSENIC	8.3E+00	4.6E+01	4.6E+01
LEAD	1.2E+02	3.3E+02	1.2E+02

Table 3-3
Onsite Soil Samples (Surface and Subsurface)
Chevron Orlando Site
Risk Assessment

Compound or Analyte (mg/kg)	95% Upper Confidence Limit	Maximum Value	Exposure Point Concentration
<u>PESTICIDE/PCBs</u>			
4,4'-DDD	1.7E+01	2.1E+02	1.7E+01
4,4'-DDE	2.1E+00	2.1E+01	2.1E+00
4,4'-DDT	2.7E+00	5.8E+01	2.7E+00
ALDRIN	1.5E+00	2.3E+01	1.5E+00
ALPHA-BHC	1.4E+00	1.3E+02	1.4E+00
BETA-BHC	1.2E+00	2.1E+01	1.2E+00
CHLORDANE	4.6E+01	3.5E+02	4.6E+01
DIELDRIN	2.0E+00	1.9E+01	2.0E+00
GAMMA-BHC	1.4E+00	1.9E+01	1.4E+00
ENDRIN	1.1E+01	6.7E+00	6.7E+00

Table 3-4
Trailer Park Soil Samples (Surface)
Chevron Orlando Site
Risk Assessment

Compound or Analyte (mg/kg)	95% Upper Confidence Limit	Maximum Value	Exposure Point Concentration
CHLORDANE	3.9E+00	5.3E+00	3.9E+00
DIELDRIN	6.6E-02	1.1E+00	6.6E-02
<u>INORGANICS</u>			
LEAD	2.5E-01	1.3E-01	1.3E-01

Table 4-1
Chemical-Specific Toxicity Values
Chevron Orlando Site
Risk Assessment

Contaminants or Chemicals	Ingestion Exposures				
	Oral Slope Factor (SF) mg/kg day	Wt of Ev	Oral Reference Dose (RfD) mg/kg day	R e f	Target Organ or System
1,4-Dichlorobenzene	2.4E-02	C		H	GI tract
2-Methylnaphthalene			3.0E-02		GI tract
2,4-Dimethylphenol			2.0E-02	I	
4,4'-DDD	2.4E-01	B2		I	
4,4'-DDE	3.4E-01	B2		I	liver,CNS
4,4'-DDT	3.4E-01	B2	5.0E-04	I	fetotoxic, liver
Aldrin	1.7E+01	B2	3.0E-05	I	liver
Alpha-BHC	6.3E+00	B2		I	liver
Arochlor-1260	7.7E+00	B2		I	blood, liver
Arsenic	1.8E+00	A	3.0E-04	C/I	increased BP
Benzene	2.9E-02	A		I	stomach/nasal
Beta-BHC	1.8E+00	C		I	liver
Chlordane	1.3E+00	B2	6.0E-05	I	liver
Chlorobenzene		D	2.0E-02	I	liver,kidney
Delta-BHC				I	liver,kidney
Dieldrin	1.6E+01	B2	5.0E-05	I	liver
Di-n-Butylphthalate		D	1.0E-01	I	liver,kidney,blood
Endrin		D	3.0E-04	I	
Ethylbenzene		D	1.0E-01	I	lung/liver,RBCs
Fenthion					
Heptachlor Epoxide	9.1E+00	B2	1.3E-05	I	kidney
Lead		B2			
Lindane (Gamma-BHC)	1.3E+00	B2	3.0E-04	I	liver, kidney
Naphthalene		D	4.0E-02	I	splenic capsule
Xylene (mixed)		D	2.0E+00	I	fetotoxic

NOTES:

I - Integrated Risk Information System

H - Health Effects Assessment Summary Tables

H2 - Health Effects Assessment Summary Tables, table 2

A - Predicted value listed in "EPA Research and Development, Interim Guidance for Dermal Exposure Assessment," March, 1991

B - Modeled value listed in "EPA Research and Development, Interim Guidance for Dermal Exposure Assessment," March, 1991

C - Value based on unit risk

D - Reference: EPA, 1992a

E - EPA Environmental Criteria Assessment Office, provisional value

RfD = Reference Dose RfC = Reference Concentration

WT OF EV = Weight of Evidence Classification

Table 4-1 (cont'd)
Chemical-Specific Toxicity Values
Chevron Orlando Site
Risk Assessment

Contaminants or Chemicals	Inhalation Exposures						
	Inhalation Slope Factor (SF) kg day/mg	Wt of ev	Reference Conc. (RfC) mg/cu m	Inhalation RfD Converted from RfC mg/kg day	R e f	Volatile ization Rate	Target Organ or System
1,4-Dichlorobenzene		C	8.0E-01	2.3E-01	H	2.00E-01	NA/liver, kidney
2-Methylnaphthalene						1.00E-01	
4,4'-DDD						1.00E-01	
4,4'-DDE		B2			H	1.00E-01	NA
4,4'-DDT	3.4E-01	B2			H	1.00E-01	liver
Aldrin	1.7E+01	B2			I	1.00E-01	liver
Alpha-BHC	6.3E+00	B2			I	1.00E-01	NA
Arochlor-1260		B2			H	1.00E-01	NA
Arsenic	5.0E+01	A			H	0.00E+00	respiratory tract
Benzene	2.9E-02	A	2.0E-03	1.7E-03	E	1.00E+00	leukemia
Beta-BHC	1.8E+00	C			I	1.00E-01	NA
Chlordane	1.3E+00	B2	5.0E+01		H	1.00E-01	
Chlorobenzene		D	2.0E-02	5.7E-03		1.00E+00	liver, kidney
Delta-BHC						1.00E-01	
Dieldrin	1.6E+01	B2			H	1.00E-01	liver
Di-n-Butylphthalate						1.00E-01	
Endrin							
Ethylbenzene			1.0E+00	2.9E-01		1.00E+00	
Fenthion							
Heptachlor Epoxide	9.1E+00	B2			H	1.00E-01	liver
Lead						0.00E+00	
Lindane (Gamma-BHC)		B2			H	1.00E-01	
Naphthalene						1.00E-01	
Xylene (mixed)				2.0E+00	D	1.00E+00	CNS, nose, throat

NOTES:

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H2 - Health Effects Assessment Summary Tables, table 2

A - Predicted value listed in "EPA Research and Development, Interim Guidance for Dermal Exposure Assessment," March, 1991

B - Modeled value listed in "EPA Research and Development, Interim Guidance for Dermal Exposure Assessment," March, 1991

C - Value based on unit risk

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RfD = Reference Dose RfC = Reference Concentration

WT OF EV = Weight of Evidence Classification

Table 4-1 (cont'd)
 Chemical-Specific Toxicity Values
 Chevron Orlando Site
 Risk Assessment

Contaminants or Chemicals	Dermal Exposures					
	Oral Absorption Efficiency percent	Oral Absorption Efficiency Reference	Dermal Extrapolated Reference Dose (RfD) mg/kg day	Dermal Extrapolated Slope Factor (SF) kg day/mg	Soil Absorp- tion Factor (unitless)	R e f
1,4-Dichlorobenzene	1.0E+02	ATSDR, 1987		2.4E-02	1.0E-02	D
2-Methylnaphthalene	5.0E+01	D	1.5E-02		1.0E-02	D
4,4'-DDD	5.0E+01	D		4.8E-01	1.0E-02	D
4,4'-DDE	5.0E+01	D		6.8E-01	1.0E-02	D
4,4'-DDT	5.0E+01	D	2.5E-04	6.8E-01	1.0E-02	D
Aldrin	5.0E+01	D	1.5E-05	3.4E+01	1.0E-02	D
Alpha-BHC	5.0E+01	D		1.3E+01	1.0E-02	D
Arochlor-1260	9.0E+01	ATSDR, 1987		8.6E+00	1.0E-02	D
Arsenic	9.5E+01	ATSDR, 1987	2.9E-04	1.8E+00	1.0E-03	D
Benzene	9.0E+01	ATSDR, 1987		3.2E-02	1.0E-02	D
Beta-BHC	5.0E+01	D		3.6E+00	1.0E-02	D
Chlordane	5.0E+01	D	3.0E-05	2.6E+00	1.0E-02	D
Chlorobenzene	3.1E+01	ATSDR, 1989	6.2E-03		1.0E-02	D
Delta-BHC	5.0E+01	D			1.0E-02	D
Dieldrin	5.0E+01	D	2.5E-05	3.2E+01	1.0E-02	D
Di-n-Butylphthalate	9.7E+01	ATSDR, 1989	9.7E-02		1.0E-02	D
Endrin	5.0E+01	D	1.5E-04			
Ethylbenzene	9.2E+01	ATSDR, 1989	9.2E-02		1.0E-02	D
Fenthion						
Heptachlor Epoxide	1.0E+02	ATSDR, 1987	1.3E-05	9.1E+00	1.0E-02	D
Lead	1.5E+01	ATSDR, 88 Adult			1.0E-03	D
Lindane (Gamma-BHC)	5.0E+01	D	1.5E-04	2.6E+00	1.0E-02	D
Naphthalene	5.0E+01	D	2.0E-02		1.0E-02	D
Xylene (mixed)	9.2E+01	ATSDR, 1989	1.8E+00		1.0E-02	D

NOTES:

I - Integrated Risk Information System

H - Health Effects Assessment Summary Tables

H2 - Health Effects Assessment Summary Tables, table 2

A - Predicted value listed in "EPA Research and Development, Interim Guidance for Dermal Exposure Assessment," March, 1991

B - Modeled value listed in "EPA Research and Development, Interim Guidance for Dermal Exposure Assessment," March, 1991

C - Value based on unit risk

D - Reference: EPA, 1992a

E - EPA Environmental Criteria Assessment Office, provisional value

RfD = Reference Dose RfC = Reference Concentration

WT OF EV = Weight of Evidence Classification

Table 5-3
Incidental Ingestion of Offsite Surface Soil (0 - 1')
Offsite Adult
(Current/Future Residential Scenario)

**Chevron Orlando Site
Risk Assessment**

Contaminants or Chemicals	RME Conc (CS) mg/kg	Chronic Non-Carcinogenic Effects				Lifetime Carcinogenic Effects			
		Human Intake Factor (HIF) kg/kg-day	Daily Intake mg/kg-day	Oral RfD mg/kg-day	Hazard Quotient (HQ) unitless	Human Intake Factor (HIF) kg/kg-day	Daily Intake mg/kg-day	Oral Slope Factor kg-day/mg	Risk unitless
Chlordane	3.9E+00	1.4E-06	5.5E-06	6.0E-05	9.2E-02	4.7E-07	1.8E-06	1.3E+00	2.4E-06
Dieldrin	6.6E-02	1.4E-06	9.2E-08	5.0E-05	1.8E-03	4.7E-07	3.1E-08	1.6E+01	5.0E-07
Lead	1.3E-01	1.4E-06	1.8E-07			4.7E-07	6.1E-08		
		Total Pathway Hazard Index-->				9E-02	Total Pathway Risk-->		

INCIDENTAL INGESTION OF SOIL

CS = Concentration of chemical in soil (mg/kg)

1.0E-06 CF = 0.000001 kg/mg - Conversion Factor, (EPA, 1989a)

1.0E+02 IRA = 100 mg/day - Ingestion Rate of soil by an adult (7-30 yrs.), (OSWER, 1991)

2.4E+01 EDA = 24 yrs - Exposure Duration for an adult (7-30 yrs), (OSWER, 1991)

3.5E+02 EFA = 350 days/yr - Exposure Frequency for an adult (7-30 yrs), (OSWER, 1991)

7.0E+01 BWA = 70 kg - Body Weight for adult, (OSWER, 1991)

2.4E+01 ATN = 24 yrs - Averaging Time for non-carcinogenic compounds, (OSWER, 1991)

7.0E+01 ATC = 70 yrs - Averaging Time for carcinogenic compounds, (OSWER, 1991)

HIF-NON-CARCINOGENIC-->

1.4E-06 HIF = (IRA * EFA * EDA / BWA)*CF / (ATN)(365)

HIF-CARCINOGENIC-->

4.7E-07 HIF = (IRA * EFA * EDA / BWA)*CF / (ATC)(365)

DAILY INTAKE = (CS * HIF)

RISK (non-carcinogenic) = (INTAKE / RfD)

RISK (carcinogenic) = (INTAKE * SLOPE FACTOR)

Table 5-4
Dermal Contact with Offsite Surface Soil (0 - 1')
Offsite Adult
(Current/Future Residential Scenario)

**Chevron Orlando Site
Risk Assessment**

Contaminants or Chemicals	RME Conc (CS) mg/kg	Absorption Factor (ABS) unitless	Chronic Non-Carcinogenic Effects				Lifetime Carcinogenic Effects			
			Human Intake Factor (HIF) kg/kg-day	Daily Intake mg/kg-day	Adjusted Dermal RfD mg/kg-day	Hazard Quotient (HQ) unitless	Human Intake Factor (HIF) kg/kg-day	Daily Intake mg/kg-day	Adjusted Dermal Slope Factor kg-day/mg	Risk unitless
Chlordane	3.9E+00	1.0E-02	7.3E-05	2.8E-08	3.0E-05	9.4E-02	2.5E-05	9.7E-07	2.6E+00	2.5E-06
Dieldrin	6.6E-02	1.0E-02	7.3E-05	4.8E-08	2.5E-05	1.9E-03	2.5E-05	1.6E-08	3.2E+01	5.3E-07
Lead	1.3E-01	1.0E-03	7.3E-05	9.4E-09			2.5E-05	3.2E-09		
Total Pathway Hazard Index----->						1E-01	Total Pathway Risk----->			3E-06

DERMAL CONTACT WITH SOIL

CS = Concentration of chemical in soil (mg/kg)

ABS = Absorption Factor - Assumed to be 0.25 for volatiles, 0.1 for semi-volatiles, 0.01 for metals (Ryan, 1987), and 0.60 for ordnance compounds

1.0E-06 CF = 0.000001 kg/mg - Conversion Factor, (EPA, 1989a)

5.3E+03 SAA = 5300 sq cm - Skin Surface Area Available, (Adult), hands, arms, lower legs (OSWER, 1991)

3.5E+02 EFA = 350 days/yr - Exposure Frequency, (Adult: 7-30 yrs.), (OSWER, 1991)

2.4E+01 EDA = 24 yrs - Exposure Duration for adult (7-30 yrs.), (OSWER, 1991)

7.0E+01 BWA = 70 kg - Body Weight for adult, (OSWER, 1991)

2.4E+01 ATN = 24 yrs - Averaging Time for non-carcinogenic compounds, (OSWER, 1991)

7.0E+01 ATC = 70 yrs - Averaging Time for carcinogenic compounds, (OSWER, 1991)

1.0E+00 AF = 1.00 mg/sq cm - Adherence Factor, (EPA, Region X)

HIF--NON-CARCINOGENIC----->

7.3E-05 HIF = [(SAA * EFA * EDA * AF / BWA) * CF / (ATN)(365)]

HIF--CARCINOGENIC----->

2.5E-05 HIF = [(SAA * EFA * EDA * AF / BWA) * CF / (ATC)(365)]

DAILY INTAKE = (CS * ABS * HIF)

RISK (non-carcinogenic) = (INTAKE / RfD)

RISK (carcinogenic) = (INTAKE * SLOPE FACTOR)

Table 5-5
Incidental Ingestion of Offsite Surface Soil (0 - 1')
Offsite Child (age 1 - 6)
(Current/Future Residential Scenario)

**Chevron Orlando Site
Risk Assessment**

Contaminants or Chemicals	RME Conc (CS) mg/kg	Chronic Non-Carcinogenic Effects				Lifetime Carcinogenic Effects			
		Human Intake Factor (HIF) kg/kg-day	Daily Intake mg/kg-day	Oral RfD mg/kg-day	Hazard Quotient (HQ) unitless	Human Intake Factor (HIF) kg/kg-day	Daily Intake mg/kg-day	Oral Slope Factor kg-day/mg	Risk unitless
Chlordane	3.9E+00	1.3E-05	5.0E-05	6.0E-05	8.3E-01	1.1E-06	4.3E-06	1.3E+00	5.6E-06
Dieldrin	8.6E-02	1.3E-05	8.6E-07	5.0E-05	1.7E-02	1.1E-06	7.2E-08	1.6E+01	1.2E-06
Lead	1.3E-01	1.3E-05	1.7E-06			1.1E-06	1.4E-07		
		Total Pathway Hazard Index----->				8E-01	Total Pathway Risk----->		

INCIDENTAL INGESTION OF SOIL

CS = Concentration of chemical in soil (mg/kg)

1.0E-08 CF = 0.000001 kg/mg - Conversion Factor, (EPA, 1989a)

2.0E+02 IRC = 200 mg/day - Ingestion Rate of soil by a child (1-6 yrs.), (OSWER, 1991)

6.0E+00 EDC = 6 yrs - Exposure Duration for a child (1-6 yrs), (OSWER, 1991)

3.5E+02 EFC = 350 days/yr - Exposure Frequency for a child (1-6 yrs), (OSWER, 1991)

1.5E+01 BWC = 15 kg - Body Weight for a child (1-6 yrs), (OSWER, 1991)

6.0E+00 ATN = 6 yrs - Averaging Time for non-carcinogenic compounds, (OSWER, 1991)

7.0E+01 ATC = 70 yrs - Averaging Time for carcinogenic compounds, (OSWER, 1991)

HIF-NON-CARCINOGENIC----->

1.3E-05 HIF = ((IRC * EFC * EDC / BWC) * CF / (ATN)(365)

HIF-CARCINOGENIC----->

1.1E-06 HIF = (IRC * EFC * EDC / BWC) * CF / (ATC)(365)

DAILY INTAKE = (CS * HIF)

RISK (non-carcinogenic) = (INTAKE / RfD)

RISK (carcinogenic) = (INTAKE * SLOPE FACTOR)

Table 5-6
Dermal Contact with Offsite Surface Soil (0 - 1')
Offsite Child (age 1 - 6)
(Current/Future Residential Scenario)

**Chevron Orlando Site
Risk Assessment**

Contaminants or Chemicals	RME Conc (CS) mg/kg	Absorption Factor (ABS) unitless	Chronic Non-Carcinogenic Effects				Lifetime Carcinogenic Effects			
			Human Intake Factor (HIF) kg/kg-day	Daily Intake mg/kg-day	Adjusted Dermal RfD mg/kg-day	Hazard Quotient (HQ) unitless	Human Intake Factor (HIF) kg/kg-day	Daily Intake mg/kg-day	Adjusted Dermal Slope Factor kg-day/mg	Risk unitless
Chlordane	3.9E+00	1.0E-02	2.0E-04	7.9E-08	3.0E-05	2.6E-01	1.7E-05	6.8E-07	2.6E+00	1.8E-06
Dieldrin	6.6E-02	1.0E-02	2.0E-04	1.3E-07	2.5E-05	5.3E-03	1.7E-05	1.1E-08	3.2E+01	3.7E-07
Lead	1.3E-01	1.0E-03	2.0E-04	2.6E-08			1.7E-05	2.3E-09		
			Total Pathway Hazard Index----->		3E-01		Total Pathway Risk----->		2E-06	

DERMAL CONTACT WITH SOIL

CS = Concentration of chemical in soil (mg/kg)

ABS = Absorption Factor - Assumed to be 0.25 for volatiles, 0.1 for semi-volatiles,

0.01 for metals (Ryan, 1987), and 0.60 for ordnance compounds

1.0E-06 CF = 0.000001 kg/mg - Conversion Factor, (EPA, 1989a)

3.2E+03 SAC = 3160 sq cm - Skin Surface Area Available (Child 1-6 yrs.), hands, arms, legs (OSWER, 1991)

3.5E+02 EFC = 350 days/yr - Exposure Frequency, (Child: 1-6 yrs.) (OSWER, 1991)

6.0E+00 EDC = 6 yrs - Duration for child (1-6 yrs.), (OSWER, 1991)

1.5E+01 BWC = 15 kg - Body Weight for a child (1-6 yrs.), (OSWER, 1991)

6.0E+00 ATN = 6 yrs - Averaging Time for non-carcinogenic compounds, (OSWER, 1991)

7.0E+01 ATC = 70 yrs - Averaging Time for carcinogenic compounds, (OSWER, 1991)

1.0E+00 AF = 1.00 mg/sq cm - Adherence Factor, (EPA, 1992a)

HIF-NON-CARCINOGENIC----->

$$2.0E-04 \text{ HIF} = [(SAC * EFC * EDC * AF / BWC) * CF / (ATN)(365)]$$

HIF-CARCINOGENIC----->

$$1.7E-05 \text{ HIF} = [(SAC * EFC * EDC * AF / BWC) * CF / (ATC)(365)]$$

DAILY INTAKE = (CS * ABS * HIF)

RISK (non-carcinogenic) = (INTAKE / RfD)

RISK (carcinogenic) = (INTAKE * SLOPE FACTOR)

Table 5-9
Incidental Ingestion of Onsite Subsurface Soil (0-10')
Onsite Adult
(Future Construction Worker Scenario)

Chevron Orlando Site
Risk Assessment

Contaminants or Chemicals	RME Conc (CS) mg/kg	Chronic Non-Carcinogenic Effects					Lifetime Carcinogenic Effects			
		Human Intake Factor (HIF) kg/kg-day	Daily Intake mg/kg-day	Oral RfD mg/kg-day	Hazard Quotient (HQ) unitless	Human Intake Factor (HIF) kg/kg-day	Daily Intake mg/kg-day	Oral Slope Factor kg-day/mg	Risk unitless	
4,4'-DDD	1.7E+01	2.0E-06	3.3E-05			2.8E-08	4.8E-07	2.4E-01	1.1E-07	
4,4'-DDE	2.1E+00	2.0E-06	4.2E-06			2.8E-08	5.9E-08	3.4E-01	2.0E-08	
4,4'-DDT	2.7E+00	2.0E-06	5.4E-06	5.0E-04	1.1E-02	2.8E-08	7.6E-08	3.4E-01	2.6E-08	
Aldrin	1.5E+00	2.0E-06	3.0E-06	3.0E-05	1.0E-01	2.8E-08	4.2E-08	1.7E+01	7.1E-07	
Alpha-BHC	1.4E+00	2.0E-06	2.8E-06			2.8E-08	3.9E-08	6.3E+00	2.5E-07	
Beta-BHC	1.2E+00	2.0E-06	2.3E-06			2.8E-08	3.4E-08	1.8E+00	6.0E-08	
Chlordane	4.6E+01	2.0E-06	9.2E-05	6.0E-05	1.5E+00	2.8E-08	1.3E-06	1.3E+00	1.7E-06	
Dieldrin	2.0E+00	2.0E-06	4.0E-06	5.0E-05	8.0E-02	2.8E-08	5.6E-08	1.6E+01	9.0E-07	
Lindane (Gamma-BHC)	1.4E+00	2.0E-06	2.8E-06	3.0E-04	9.3E-03	2.8E-08	3.9E-08	1.3E+00	5.1E-08	
Endrin	6.7E+00	2.0E-06	1.3E-05	3.0E-04	4.5E-02	2.8E-08	1.9E-07			
Total Pathway Hazard Index →						2E+00	Total Pathway Risk →			4E-06

INCIDENTAL INGESTION OF SOIL

CS = Concentration of chemical in soil (mg/kg)

- Assumed Value

1.0E-06 CF = 0.000001 kg/mg - Conversion Factor, (EPA, 1989a)

2.0E+02 IR = 200 mg/day - Ingestion Rate of soil by an adult worker, (OSWER, 1991)

1.0E+00 ED = 1 yr - Exposure Duration for an adult worker, (OSWER, 1991)

2.5E+02 EF = 250 days/yr - Exposure Frequency for an adult worker (5 days/wk for 50 wks) #

7.0E+01 BW = 70 kg - Body Weight for adult worker, (OSWER, 1991)

1.0E+00 ATN = 1 yr - Averaging Time for non-carcinogenic compounds, (OSWER, 1991)

7.0E+01 ATC = 70 yrs - Averaging Time for carcinogenic compounds, (OSWER, 1991)

HIF-NON-CARCINOGENIC →

2.0E-08 HIF = ((CF * IR * ED * EF / BW) / (ATN)(365)

2.8E-08 HIF = ((CF * IR * ED * EF / BW) / (ATC)(365)

DAILY INTAKE = (CS * HIF)

RISK (non-carcinogenic) = (INTAKE / RfD)

RISK (carcinogenic) = (INTAKE * SLOPE FACTOR)

Table 5-10
Dermal Contact with Onsite Subsurface Soil (0-10')
Onsite Adult
(Future Construction Worker Scenario)

**Chevron Orlando Site
Risk Assessment**

Contaminants or Chemicals	RME Conc (CS) mg/kg	Absorption Factor (ABS) unitless	Chronic Non-Carcinogenic Effects				Lifetime Carcinogenic Effects			
			Human Intake Factor (HIF) kg/kg-day	Daily Intake mg/kg-day	Adjusted Dermal RfD mg/kg-day	Hazard Quotient (HQ) unitless	Human Intake Factor (HIF) kg/kg-day	Daily Intake mg/kg-day	Adjusted Dermal Slope Factor kg-day/mg	Risk unitless
4,4'-DDD	1.7E+01	1.0E-02	2.0E-05	3.3E-06			2.8E-07	4.8E-08	4.8E-01	2.3E-08
4,4'-DDE	2.1E+00	1.0E-02	2.0E-05	4.1E-07			2.8E-07	5.9E-09	6.8E-01	4.0E-09
4,4'-DDT	2.7E+00	1.0E-02	2.0E-05	5.3E-07	2.5E-05	2.2E-03	2.8E-07	7.6E-09	6.8E-01	5.2E-09
Aldrin	1.5E+00	1.0E-02	2.0E-05	2.9E-07	1.5E-05	2.0E-02	2.8E-07	4.2E-09	3.4E+01	1.4E-07
Alpha-BHC	1.4E+00	1.0E-02	2.0E-05	2.7E-07			2.8E-07	3.9E-09	1.3E+01	4.9E-08
Beta-BHC	1.2E+00	1.0E-02	2.0E-05	2.3E-07			2.8E-07	3.4E-09	3.6E+00	1.2E-08
Chlordane	4.6E+01	1.0E-02	2.0E-05	9.0E-06	3.0E-05	3.0E-01	2.8E-07	1.3E-07	2.6E+00	3.3E-07
Dieldrin	2.0E+00	1.0E-02	2.0E-05	3.9E-07	2.5E-05	1.6E-02	2.8E-07	5.6E-09	3.2E+01	1.8E-07
Lindane (Gamma-BHC)	1.4E+00	1.0E-02	2.0E-05	2.7E-07	1.5E-04	1.8E-03	2.8E-07	3.9E-09	2.6E+00	1.0E-08
Endrin	6.7E+00	1.0E-02	2.0E-05	1.3E-06	1.5E-04	8.7E-03	2.8E-07	1.9E-08		
Total Pathway Hazard Index----->							3E-01	Total Pathway Risk----->		
8E-07										

DERMAL CONTACT WITH SOIL

CS = Concentration of chemical in soil (mg/kg)

ABS = Absorption Factor - Assumed to be 0.01 for organics and 0.001 for inorganics

- Assumed Value

1.0E-08 CF = 0.000001 kg/mg - Conversion Factor, (EPA, 1989a)

2.0E+03 SA = 2000 sq cm - Skin Surface Area Available for Contact, hands and forearms, (EPA, 1989d)

2.5E+02 EF = 250 days/yr - Exposure Frequency for an adult worker (5 days/wk for 50 wks) #

1.0E+00 ED = 1 yr - Exposure Duration for adult worker, (OSWER, 1991)

7.0E+01 BW = 70 kg - Body Weight for adult worker, (OSWER, 1991)

1.0E+00 ATN = 1 yr - Averaging Time for non-carcinogenic compounds, (OSWER, 1991)

7.0E+01 ATC = 70 yrs - Averaging Time for carcinogenic compounds, (OSWER, 1991)

1.0E+00 AF = 1.00 mg/sq cm - Adherence Factor, (EPA, Region X)

HIF-NON-CARCINOGENIC----->

2.0E-05 HIF = (CF * SA * EF * ED * AF / BW) / (ATN)(365)

HIF-CARCINOGENIC----->

2.8E-07 HIF = (CF * SA * EF * ED * AF / BW) / (ATC)(365)

DAILY INTAKE = (CS * ABS * HIF)

RISK (non-carcinogenic) = (INTAKE / RfD)

RISK (carcinogenic) = (INTAKE * SLOPE FACTOR)

Table 5-15
Ingestion of Groundwater
Onsite Adult
(Future Residential Scenario)

Chevron Orlando Site
Risk Assessment

Contaminants or Chemicals	RME Conc (CW) (mg/L)	Chronic Non-Carcinogenic Effects				Lifetime Carcinogenic Effects			
		Human Intake Factor (HIF) (L/kg-day)	Daily Intake (mg/kg-day)	Oral RfD (mg/kg-day)	Hazard Quotient (HQ) (unitless)	Human Intake Factor (HIF) (L/kg-day)	Daily Intake (mg/kg-day)	Oral Slope Factor (kg-day/mg)	Risk (unitless)
Benzene	4.2E-03	2.7E-02	1.2E-04			9.4E-03	3.9E-05	2.9E-02	1.1E-08
Chlorobenzene	9.9E-03	2.7E-02	2.7E-04	2.0E-02	1.3E-02	9.4E-03	9.3E-05		
Ethylbenzene	2.0E+00	2.7E-02	5.4E-02	1.0E-01	5.4E-01	9.4E-03	1.9E-02		
Xylene (mixed)	5.9E+00	2.7E-02	1.6E-01	2.0E+00	8.1E-02	9.4E-03	5.5E-02		
1,4-Dichlorobenzene	2.4E-02	2.7E-02	6.5E-04			9.4E-03	2.3E-04	2.4E-02	5.4E-06
4,4'-DDD	3.0E-03	2.7E-02	8.1E-05			9.4E-03	2.8E-05	2.4E-01	6.8E-06
Alpha-BHC	9.2E-03	2.7E-02	2.5E-04			9.4E-03	8.6E-05	6.3E+00	5.4E-04
Arochlor-1260	2.1E-03	2.7E-02	5.8E-05			9.4E-03	2.0E-05	7.7E+00	1.5E-04
Beta-BHC	7.0E-02	2.7E-02	1.9E-03			9.4E-03	8.6E-04	1.8E+00	1.2E-03
Delta-BHC	3.7E-02	2.7E-02	1.0E-03			9.4E-03	3.5E-04		
Lindane (Gamma-BHC)	3.6E-03	2.7E-02	9.7E-05	3.0E-04	3.2E-01	9.4E-03	3.4E-05	1.3E+00	4.4E-05
2-Methylnaphthalene	1.1E-01	2.7E-02	3.0E-03			9.4E-03	1.0E-03		
2,4-Dimethylphenol	2.8E-02	2.7E-02	7.6E-04	2.0E-02	3.8E-02	9.4E-03	2.6E-04		
Naphthalene	1.1E-01	2.7E-02	3.0E-03	4.0E-02	7.4E-02	9.4E-03	1.0E-03		
Arsenic	4.6E-02	2.7E-02	1.2E-03	3.0E-04	4.1E+00	9.4E-03	4.3E-04	1.8E+00	7.6E-04
Lead	1.2E-01	2.7E-02	3.3E-03			9.4E-03	1.1E-03		
Total Pathway Hazard Index----->					5E+00	Total Pathway Risk----->			

INGESTION OF GROUNDWATER

CW = Concentration of chemical in water (mg/L)

2.0E+00 IRA = 2 L/day - Ingestion Rate of water by an adult (7-30 yrs.), (OSWER, 1991)

2.4E+01 EDA = 24 yrs - Exposure Duration for an adult (7-30 yrs), (OSWER, 1991)

3.5E+02 EFA = 350 days/yr - Exposure Frequency for an adult (7-30 yrs), (OSWER, 1991)

7.0E+01 BWA = 70 kg - Body Weight for adult, (OSWER, 1991)

2.4E+01 ATN = 24 yrs - Averaging Time for non-carcinogenic compounds, (OSWER, 1991)

7.0E+01 ATC = 70 yrs - Averaging Time for carcinogenic compounds, (OSWER, 1991)

HIF--NON-CARCINOGENIC----->

2.7E-02 HIF = (IRA * EFA * EDA / BWA) / (ATN)(365)

HIF--CARCINOGENIC----->

9.4E-03 HIF = (IRA * EFA * EDA / BWA) / (ATC)(365)

DAILY INTAKE = (CW * HIF)

RISK (non-carcinogenic) = (INTAKE / RfD)

RISK (carcinogenic) = (INTAKE * SLOPE FACTOR)

Table 5-16
Inhalation of Groundwater (Volatilized Contaminants)
Onsite Adult
(Future Residential Scenario)

**Chevron Orlando Site
Risk Assessment**

Contaminants or Chemicals	RME Conc (CW) (mg/L)	Chronic Non-Carcinogenic Effects				Lifetime Carcinogenic Effects			
		Human Intake Factor (HIF) (L/kg-day)	Daily Intake (mg/kg-day)	Inhalation RfD (mg/kg-day)	Hazard Quotient (HQ) (unitless)	Human Intake Factor (HIF) (L/kg-day)	Daily Intake (mg/kg-day)	Inhalation Slope Factor (kg-day/mg)	Inhalation Risk (unitless)
Benzene	4.2E-03	2.7E-02	1.1E-04	1.7E-03	6.4E-02	9.4E-03	3.9E-05	2.9E-02	1.1E-06
Chlorobenzene	9.9E-03	2.7E-02	2.7E-04	5.7E-03	4.7E-02	9.4E-03	9.3E-05		
Ethylbenzene	2.0E+00	2.7E-02	5.5E-02	2.9E-01	1.9E-01	9.4E-03	1.9E-02		
Xylene (mixed)	5.9E+00	2.7E-02	1.8E-01	2.0E+00	8.1E-02	9.4E-03	5.5E-02		
1,4-Dichlorobenzene	2.4E-02	2.7E-02	6.5E-04	2.3E-01	6.6E-04	9.4E-03	2.3E-04	2.4E-02	5.4E-06
4,4'-DDD	3.0E-03	2.7E-02	8.1E-05			9.4E-03	2.8E-05		
Alpha-BHC	9.2E-03	2.7E-02	2.5E-04			9.4E-03	8.8E-05		
Arochlor-1260	2.1E-03	2.7E-02	5.8E-05			9.4E-03	2.0E-05		
Beta-BHC	7.0E-02	2.7E-02	1.9E-03			9.4E-03	6.6E-04		
Delta-BHC	3.7E-02	2.7E-02	1.0E-03			9.4E-03	3.5E-04		
Lindane (Gamma-BHC)	3.6E-03	2.7E-02	9.7E-05			9.4E-03	3.4E-05		
2-Methylnaphthalene	1.1E-01	2.7E-02	3.0E-03			9.4E-03	1.0E-03		
2,4-Dimethylphenol	2.8E-02	2.7E-02	7.6E-04			9.4E-03	2.6E-04		
Naphthalene	1.1E-01	2.7E-02	3.0E-03			9.4E-03	1.0E-03		
Arsenic	4.6E-02	2.7E-02	1.2E-03			9.4E-03	4.3E-04		
Lead	1.2E-01	2.7E-02	3.3E-03			9.4E-03	1.1E-03		
Total pathway Hazard Index----->				4E-01	Total pathway Risk----->				7E-08

INHALATION DUE TO SHOWERING

CW = Concentration of Chemical in water (mg/L)

2.0E+00 IRA = 2 L/day - Ingestion Rate of water by an adult (7-30 yrs.), (OSWER, 1991)

3.5E+02 EFA = 350 days/ year - Exposure Frequency, (OSWER, 1991)

2.4E+01 EDA = 24 years - Exposure duration for adult (7-30 yrs), (OSWER, 1991)

7.0E+01 BWA = 70 kg - Body Weight for adult, (OSWER, 1991)

2.4E+01 ATN = 24 years - Averaging Time for non-carcinogenic compounds (OSWER, 1991)

7.0E+01 ATC = 70 years - Averaging Time for carcinogenic compounds, (OSWER, 1991)

$$2.7E-02 \text{ HIF} = (\text{IRA} * \text{EFA} * \text{EDA} / \text{BWA}) / (\text{ATN})(365)$$

$$9.4E-03 \text{ HIF} = (\text{IRA} * \text{EFA} * \text{EDA} / \text{BWA}) / (\text{ATC})(365)$$

DAILY INTAKE = (CW * HIF) - Assumes ingestion of 2 L/day groundwater

RISK (non-carcinogenic) = (INTAKE / RfD)

RISK (carcinogenic) = (INTAKE * SLOPE FACTOR)

- Assumed Values

HIF-NON-CARCINOGENIC----->

HIF-CARCINOGENIC----->

Table 5-17
Ingestion of Groundwater
Onsite Child (age 1 - 6)
(Future Residential Scenario)

Chevron Orlando Site
Risk Assessment

Contaminants or Chemicals	RME Conc (CW) (mg/L)	Chronic Non-Carcinogenic Effects				Lifetime Carcinogenic Effects			
		Human Intake Factor (HIF) (L/kg-day)	Daily Intake (mg/kg-day)	Oral RfD (mg/kg-day)	Hazard Quotient (HQ) (unitless)	Human Intake Factor (HIF) (L/kg-day)	Daily Intake (mg/kg-day)	Oral Slope Factor (kg-day/mg)	Risk (unitless)
Benzene	4.2E-03	6.4E-02	2.7E-04			5.5E-03	2.3E-05	2.9E-02	6.7E-07
Chlorobenzene	9.9E-03	6.4E-02	6.3E-04	2.0E-02	3.2E-02	5.5E-03	5.4E-05		
Ethylbenzene	2.0E+00	6.4E-02	1.3E-01	1.0E-01	1.3E+00	5.5E-03	1.1E-02		
Xylene (mixed)	5.9E+00	6.4E-02	3.8E-01	2.0E+00	1.9E-01	5.5E-03	3.2E-02		
1,4-Dichlorobenzene	2.4E-02	6.4E-02	1.5E-03			5.5E-03	1.3E-04	2.4E-02	3.2E-06
4,4'-DDD	3.0E-03	6.4E-02	1.9E-04			5.5E-03	1.6E-05	2.4E-01	3.9E-06
Alpha-BHC	9.2E-03	6.4E-02	5.9E-04			5.5E-03	5.0E-05	6.3E+00	3.2E-04
Arochlor-1260	2.1E-03	6.4E-02	1.3E-04			5.5E-03	1.2E-05	7.7E+00	8.9E-05
Beta-BHC	7.0E-02	6.4E-02	4.5E-03			5.5E-03	3.8E-04	1.8E+00	6.9E-04
Delta-BHC	3.7E-02	6.4E-02	2.4E-03			5.5E-03	2.0E-04		
Lindane (Gamma-BHC)	3.6E-03	6.4E-02	2.3E-04	3.0E-04	7.7E-01	5.5E-03	2.0E-05	1.3E+00	2.6E-05
2-Methylnaphthalene	1.1E-01	6.4E-02	7.0E-03			5.5E-03	6.0E-04		
2,4-Dimethylphenol	2.8E-02	6.4E-02	1.8E-03	2.0E-02	9.0E-02	5.5E-03	1.5E-04		
Naphthalene	1.1E-01	6.4E-02	7.0E-03	4.0E-02	1.8E-01	5.5E-03	8.0E-04		
Arsenic	4.6E-02	6.4E-02	2.9E-03	3.0E-04	9.8E+00	5.5E-03	2.5E-04	1.8E+00	4.4E-04
Lead	1.2E-01	6.4E-02	7.7E-03			5.5E-03	6.6E-04		
Total Pathway Hazard Index----->					1E+01	Total Pathway Risk----->			
2E-03									

INGESTION OF GROUNDWATER

CW = Concentration of chemical in water (mg/L)

1.0E+00 IRC = 1 L/day - Ingestion Rate of water by a child (0-6 yrs.), (OSWER, 1991)

6.0E+00 EDC = 6 yrs - Exposure Duration for a child (1-6 yrs), (OSWER, 1991)

3.5E+02 EFC = 350 days/yr - Exposure Frequency for a child (1-6 yrs), (OSWER, 1991)

1.5E+01 BWC = 15 kg - Body Weight for a child (1-6 yrs), (OSWER, 1991)

6.0E+00 ATN = 6 yrs - Averaging Time for non-carcinogenic compounds, (OSWER, 1991)

7.0E+01 ATC = 70 yrs - Averaging Time for carcinogenic compounds, (OSWER, 1991)

HIF-NON-CARCINOGENIC----->

$$6.4E-02 \text{ HIF} = (\text{IRC} * \text{EFC} * \text{EDC} / \text{BWC} / (\text{ATN})(365)$$

HIF-CARCINOGENIC----->

$$5.5E-03 \text{ HIF} = (\text{IRC} * \text{EFC} * \text{EDC} / \text{BWC} / (\text{ATC})(365)$$

DAILY INTAKE = (CW * HIF)

RISK (non-carcinogenic) = (INTAKE / RID)

RISK (carcinogenic) = (INTAKE * SLOPE FACTOR)

Table 5-18
Inhalation of Groundwater (Volatileized Contaminants)
Onsite Child (age 1 - 6)
(Future Residential Scenario)

**Chevron Orlando Site
Risk Assessment**

Contaminants or Chemicals	RME Conc (CW) (mg/L)	Chronic Non-Carcinogenic Effects				Lifetime Carcinogenic Effects			
		Human Intake Factor (HIF) (L/kg-day)	Daily Intake (mg/kg-day)	Inhalation RfD (mg/kg-day)	Hazard Quotient (HQ) (unitless)	Human Intake Factor (HIF) (L/kg-day)	Daily Intake (mg/kg-day)	Inhalation Slope Factor (kg-day/mg)	Inhalation Risk (unitless)
Benzene	4.2E-03	6.4E-02	2.7E-04	1.7E-03	1.6E-01	5.5E-03	2.3E-05	2.9E-02	6.7E-07
Chlorobenzene	9.9E-03	6.4E-02	6.3E-04	5.7E-03	1.1E-01	5.5E-03	5.4E-05		
Ethylbenzene	2.0E+00	6.4E-02	1.3E-01	2.9E-01	4.5E-01	5.5E-03	1.1E-02		
Xylene (mixed)	5.9E+00	6.4E-02	3.8E-01	2.0E+00	1.9E-01	5.5E-03	3.2E-02		
1,4-Dichlorobenzene	2.4E-02	6.4E-02	1.5E-03	2.3E-01	6.7E-03	5.5E-03	1.3E-04	2.4E-02	3.2E-06
4,4'-DDD	3.0E-03	6.4E-02	1.9E-04			5.5E-03	1.6E-05		
Alpha-BHC	9.2E-03	6.4E-02	5.9E-04			5.5E-03	5.0E-05		
Arochlor-1260	2.1E-03	6.4E-02	1.3E-04			5.5E-03	1.2E-05		
Beta-BHC	7.0E-02	6.4E-02	4.5E-03			5.5E-03	3.8E-04		
Delta-BHC	3.7E-02	6.4E-02	2.4E-03			5.5E-03	2.0E-04		
Lindane (Gamma-BHC)	3.6E-03	6.4E-02	2.3E-04			5.5E-03	2.0E-05		
2-Methylnaphthalene	1.1E-01	6.4E-02	7.0E-03			5.5E-03	6.0E-04		
2,4-Dimethylphenol	2.8E-02	6.4E-02	1.8E-03			5.5E-03	1.5E-04		
Naphthalene	1.1E-01	6.4E-02	7.0E-03			5.5E-03	6.0E-04		
Arsenic	4.6E-02	6.4E-02	2.9E-03			5.5E-03	2.5E-04		
Lead	1.2E-01	6.4E-02	7.7E-03			5.5E-03	6.6E-04		
Total pathway Hazard Index----->					9E-01	Total pathway Risk----->			

INHALATION DUE TO SHOWERING

- Assumed Values

1.0E+00 IRC = 1 L/day - Ingestion Rate of water by a child (1-6 yrs.), (OSWER, 1991)

3.5E+02 EFC = 350 days/ year - Exposure Frequency, (OSWER, 1991)

6.0E+00 EDC = 6 years - Exposure duration for child (1-6 yrs.), (OSWER, 1991)

1.5E+01 BWC = 15 kg - Body Weight for child, (OSWER, 1991)

6.0E+00 ATN = 6 years - Averaging Time for non-carcinogenic compounds (OSWER, 1991)

7.0E+01 ATC = 70 years - Averaging Time for carcinogenic compounds, (OSWER, 1991)

8.4E-02 HIF = (IRA * EFA * EDA / BWA) / (ATN)(365)

5.5E-03 HIF = (IRA * EFA * EDA / BWA) / (ATC)(365)

DAILY INTAKE = (CW * HIF) - Assumes ingestion of 1 L/day groundwater

RISK (non-carcinogenic) = (INTAKE / RfD)

RISK (carcinogenic) = (INTAKE * SLOPE FACTOR)

HIF-NON-CARCINOGENIC----->

HIF-CARCINOGENIC----->

Table 5-19
Summary of Carcinogenic Risks
Chevron Orlando Site
Risk Assessment

POPULATION	EXPOSURE PATHWAY	PATHWAY RISK
Offsite Child Resident (age 1 - 6) (Current Use)	Incidental ingestion (offsite surface soil, 0'-1') Dermal contact (offsite surface soil, 0'-1') Total Risk	<u>7E-06</u> <u>2E-06</u> 9E-06
Offsite Adult Resident (age 7 - 30) (Current Use)	Incidental ingestion (offsite surface soil, 0'-1') Dermal contact (offsite surface soil, 0'-1') Total Risk	<u>3E-06</u> <u>3E-06</u> 6E-06
Offsite Resident (age 1 - 30) (Current Use)		Total Lifetime Risk (Child + Adult) 2E-05
Onsite Adolescent Trespasser (Current Use)	Incidental ingestion (onsite surface soil, 0'-1') Dermal contact (onsite surface soil, 0'-1') Total Risk	<u>5E-06</u> <u>5E-06</u> 1E-05
<hr/>		
Onsite Child Resident (age 1 - 6) (Future Use)	Ingestion (groundwater) Inhalation, from showering (groundwater) Incidental ingestion (onsite surface soil, 0'-1') Dermal contact (onsite surface soil, 0'-1') Total Risk	<u>2E-03</u> <u>4E-06</u> <u>6E-05</u> <u>2E-05</u> 2E-03
Onsite Adult Resident (age 7 - 30) (Future Use)	Ingestion (groundwater) Inhalation, from showering (groundwater) Incidental ingestion (onsite surface soil, 0'-1') Dermal contact (onsite surface soil, 0'-1') Total Risk	<u>3E-03</u> <u>7E-06</u> <u>3E-05</u> <u>3E-05</u> 3E-03
Onsite Resident (age 1 - 30) (Future Use)		Total Lifetime Risk (Child + Adult) 5E-03
Onsite Adult Worker (Future Use)	Incidental ingestion (onsite surface soil, 0'-1') Dermal contact (onsite surface soil, 0'-1') Total Risk	<u>9E-06</u> <u>8E-06</u> 2E-05
Onsite Adult Construction Worker (Future Use)	Incidental ingestion (onsite soil, 0'-10') Dermal contact (onsite soil, 0'-10') Total Risk	<u>4E-06</u> <u>8E-07</u> 5E-06
Offsite Child Resident (age 1 - 6) (Future Use)	Incidental ingestion (offsite surface soil, 0'-1') Dermal contact (offsite surface soil, 0'-1') Total Risk	<u>7E-06</u> <u>2E-06</u> 9E-06
Offsite Adult Resident (age 7 - 30) (Future Use)	Incidental ingestion (offsite surface soil, 0'-1') Dermal contact (offsite surface soil, 0'-1') Total Risk	<u>3E-06</u> <u>3E-06</u> 6E-06
Offsite Resident (age 1 - 30) (Future Use)		Total Lifetime Risk (Child + Adult) 2E-05
Onsite Adolescent Trespasser (Future Use)	Incidental ingestion (onsite surface soil, 0'-1') Dermal contact (onsite surface soil, 0'-1') Total Risk	<u>5E-06</u> <u>5E-06</u> 1E-05

Table 5-20
Summary of Non-Carcinogenic Risks
Chevron Orlando Site
Risk Assessment

POPULATION	EXPOSURE PATHWAY	PATHWAY HAZARD INDEX
Offsite Child Resident (Current Use)	Incidental ingestion (offsite surface soil, 0'-1') Dermal contact (offsite surface soil, 0'-1') Total Hazard Index	<u>8E-01</u> <u>3E-01</u> 1E+00
Offsite Adult Resident (Current Use)	Incidental ingestion (offsite surface soil, 0'-1') Dermal contact (offsite surface soil, 0'-1') Total Hazard Index	<u>9E-02</u> <u>1E-01</u> 2E-01
Onsite Adolescent Trespasser (Current Use)	Incidental ingestion (onsite surface soil, 0'-1') Dermal contact (onsite surface soil, 0'-1') Total Hazard Index	<u>2E-01</u> <u>1E-01</u> 3E-01
<hr/>		
Onsite Child Resident (Future Use)	Ingestion (groundwater) Inhalation, from showering (groundwater) Incidental ingestion (onsite surface soil, 0'-1') Dermal contact (onsite surface soil, 0'-1') Total Hazard Index	1E+01 <u>9E-01</u> <u>3E+00</u> <u>8E-01</u> 1E+01
Onsite Adult Resident (Future Use)	Ingestion (groundwater) Inhalation, from showering (groundwater) Incidental ingestion (onsite surface soil, 0'-1') Dermal contact (onsite surface soil, 0'-1') Total Hazard Index	<u>5E+00</u> <u>4E-01</u> <u>4E-01</u> <u>3E-01</u> 6E+00
Onsite Adult Worker (Future Use)	Incidental ingestion (onsite surface soil, 0'-1') Dermal contact (onsite surface soil, 0'-1') Total Hazard Index	<u>1E-01</u> <u>8E-02</u> 2E-01
Onsite Adult Construction Worker (Future Use)	Incidental ingestion (onsite soil, 0'-10') Dermal contact (onsite soil, 0'-10') Total Hazard Index	<u>2E+00</u> <u>3E-01</u> 2E+00
Offsite Child Resident (Future Use)	Incidental ingestion (offsite surface soil, 0'-1') Dermal contact (offsite surface soil, 0'-1') Total Hazard Index	<u>8E-01</u> <u>3E-01</u> 1E+00
Offsite Adult Resident (Future Use)	Incidental ingestion (offsite surface soil, 0'-1') Dermal contact (offsite surface soil, 0'-1') Total Hazard Index	<u>9E-02</u> <u>1E-01</u> 2E-01
Onsite Adolescent Trespasser (Future Use)	Incidental ingestion (onsite surface soil, 0'-1') Dermal contact (onsite surface soil, 0'-1') Total Hazard Index	<u>2E-01</u> <u>1E-01</u> 3E-01